PSEG Nuclear LLC
P.O. Box 236, Hancocks Bridge, NJ 08038-0236

PSEG Nuclear LLC

LR-N16-0195

10 CFR 50.73

OCT 31 2016

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Salem Nuclear Generating Station Unit 2
Renewed Facility Operating License No. DPR-75
NRC Docket No. 50-311

SUBJECT: LER 311/2016-006-000
Automatic Reactor Trip Due to Trip of the 21 Reactor Coolant Pump

This Licensee Event Report, "Automatic Reactor Trip Due to Trip of the 21 Reactor Coolant Pump," is being submitted pursuant to the requirements of the Code of Federal Regulations 10CFR50.73(a)(2)(iv)(A), "any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)."

Should you have any questions or comments regarding the submittal, please contact Mr. Thomas Cachaza of Regulatory Affairs at 856-339-5038.

There are no regulatory commitments contained in this letter.

Sincerely,

F. Kenneth Grover
Salem Plant Manager

tjc

Enclosure – LER 311/2016-006-000

cc D. Dorman, Administrator – Region 1
C. Parker, Licensing Project Manager – Salem
P. Finney, USNRC Senior Resident Inspector – Salem
P. Mulligan, Manager, IV, Bureau of Nuclear Engineering
T. Cachaza, Salem Commitment Coordinator
L. Marabella, Corporate Commitment Coordinator

NRC FORM 366 (11-2015) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2018

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Salem Generating Station – Unit 2	05000311	1 OF 3

4. TITLE Automatic Reactor Trip Due to Trip of the 21 Reactor Coolant Pump

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
08	31	2016	2016	006	000	10	31	2016	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
Mode 1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☑ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
100%	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Thomas J. Cachaza, Senior Regulatory Compliance Engineer	856-339-5038

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	AB	P	W120	Y	D	BK	CLR	W120	Y

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☑ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

At approximately 1500 hours on August 31, 2016, the 21 Reactor Coolant Pump (RCP) tripped resulting in an automatic reactor trip on low flow in one reactor coolant loop above the P-8 permissive (36% power permissive). As expected, the 21, 22 and 23 Auxiliary Feedwater (AFW) pumps started on low steam generator level following the unit trip. Unit 2 was stabilized in Mode 3 at normal operating temperature and pressure with the 22, 23 and 24 RCPs in-service.

The trip of the 21 RCP was caused by a Service Water (SW) leak that developed on the 22 Containment Fan Coil Unit (CFCU) motor cooler. The SW leaked on to the 21 RCP motor lead containment penetration and the motor leads in the termination box. This caused the A and C phase instantaneous overload relays to actuate causing the trip of the RCP and the subsequent reactor trip on low flow in one reactor coolant loop.

This report is being made in accordance with 10CFR50.73 (a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)," for this event actuation of the Reactor Protection System (RPS) and the Auxiliary Feedwater System (AF).

NARRATIVE

PLANT AND SYSTEM IDENTIFICATION

Westinghouse-Pressurized Water Reactor {PWR/4}

Reactor Coolant System / Reactor Coolant Pump {AB/P}

*Energy Industry Identification System (EIIS) codes and component function identifier codes appear as {SS/CCC}.

IDENTIFICATION OF OCCURRENCE

Event Date: August 31, 2016
Discovery Date: August 31, 2016

CONDITIONS PRIOR TO OCCURRENCE

Salem Unit 2 was in Mode 1, operating at 100% power.

DESCRIPTION OF OCCURRRENCE

At approximately 1500 hours on August 31, 2016, the 21 Reactor Coolant Pump (RCP) tripped resulting in an automatic reactor trip on low flow in one reactor coolant loop above the P-8 permissive (36% power permissive). As expected, the 21, 22 and 23 Auxiliary Feedwater (AFW) pumps started on low steam generator level following the unit trip. Unit 2 was stabilized in Mode 3 at normal operating temperature and pressure with the 22, 23 and 24 RCPs in-service.

The trip of the 21 RCP was caused by a Service Water (SW) leak that developed on the 22 Containment Fan Coil Unit (CFCU) motor cooler. The SW leaked on to the 21 RCP motor lead containment penetration and the motor leads in the termination box. This caused the A and C phase instantaneous overload relays to actuate causing the trip of the RCP and the subsequent reactor trip on low flow in one reactor coolant loop.

This report is being made in accordance with 10CFR50.73 (a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)," for this event actuation of the Reactor Protection System (RPS) and the Auxiliary Feedwater System (AF)."

CAUSE OF EVENT

The trip of the 21 RCP was caused by a Service Water (SW) leak that developed on the 22 Containment Fan Coil Unit (CFCU) motor cooler. The SW leaked on to the 21 RCP motor lead containment penetration and the motor leads in the termination box. This caused the A and C phase instantaneous overload relays to actuate causing the trip of the RCP and the subsequent reactor trip on low flow in one reactor coolant loop.

SAFETY CONSEQUENCES AND IMPLICATIONS

A reactor coolant pump trip ultimately causing a reactor trip at power is an analyzed condition. The reactor coolant mass flow rate required for at-power operation is assumed to be provided by four reactor coolant pumps. Lower mass flow rate at 100% power would negatively affect the Departure from Nucleate Boiling Ratio assumed in core design. However, satisfactory margin exists to preclude DNB by the initiation of a reactor trip on a reactor coolant pump trip.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Salem Generating Station – Unit 2	05000311	2016	006	000	3 OF 3

NARRATIVE

The Reactor Protection System is designed such that at greater than 36% Rated Thermal Power (RTP), a low flow condition sensed in one of four reactor coolant loops will trip the reactor. This safety feature worked to trip the reactor on 8/31/16. UFSAR Section 15 considers a partial loss of flow at power to be a condition II event (Fault of Moderate Frequency). At worst, these faults result in the reactor shutdown with the plant being capable of returning to operation. By definition, these faults (or events) do not propagate to cause a more serious fault, i.e. Condition III or IV category. In addition, Condition II events are not expected to result in fuel rod failures or Reactor Coolant System {RCS) over-pressurization. The condition II event is analyzed for the worst case condition of 100% power with a loss of flow in two reactor coolant loops.

A SW leak from a CFCU inside containment is also an analyzed condition. The approximately 50 gallon per minute leak experienced on 8/31/16 is well within a containment sump pump volumetric flow rate limit.

SAFETY SYSTEM FUNCTIONAL FAILURE

This condition did not result in a safety system functional failure as defined in NEI 99-02, Regulatory Assessment Performance Indicator Guidelines. This event did not result in a condition that would have prevented the fulfillment of a safety function of a system needed to shut down the reactor and maintain it in a safe shutdown condition, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident.

PREVIOUS EVENTS

A review of previous events for the past three years did not identify any similar events.

CORRECTIVE ACTIONS

The RCP leads and the penetration termination box were repaired.

As an extent of condition review, 18 penetrations in the area of the SW leak were inspected for water damage. No penetrations or electrical termination boxes other than those for the 21 RCP motor leads penetration were found to have sustained damage from the SW leak.

The 22 CFCU motor cooler was repaired and a failure analysis performed to determine the cause of the motor cooler gasket failure that was the source of the leak.

The surveillance procedure for SW to CFCUs that was being performed at the time of the leak was revised for both units. Additional procedures related to restoration of SW to CFCUs will be evaluated for potential improvements.

Equipment operation and maintenance improvements that will minimize leaks in the SW system inside containment will be identified and process through the Plant Health Committee for implementation.

Commitments

There are no regulatory commitments contained in this LER.